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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ORTIZ, EDGARDO

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 06/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/927,320

Applicant(s)
Darwish Et.al.

Examiner
Edgardo Ortiz

Art Unit
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on May 1, 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper Note(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2 6) ☐ Other:

Art Unit: 2815

DETAILED ACTION

This Office Action is in response to an election filed May 1, 2002 on which Applicant elected claims 1-18, with traverse, to be prosecuted.

Election/Restriction

1. Applicant's election of claims 1-18 on paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 9 include the limitation "wherein a stress in said substrate along a bottom portion of said trench does not change appreciably". It is unclear as to what Applicant refers to as a stress in the substrate and how it does not change appreciably, since the limitation does not structurally define the aforementioned stress.

Art Unit: 2815

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-18 are rejected under 35 U.S.C. § 102 (e) as being anticipated by Hshieh (U.S. Patent No. 6,262,543). With regard to Claim 1, as best the examiner is able to ascertain the claimed invention, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), including a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type opposite to said first conductivity type, adjacent to said source region and to said sidewall and a drain region, comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein a stress in said substrate along a bottom portion of said trench does not change appreciably and wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom

Art Unit: 2815

portion of said trench, said second insulative layer being coupled to said first insulative layer and said second insulative layer being thicker than said first insulative layer.

With regard to Claim 2, Hshieh teaches a gate region (125) coupled to said first insulative layer (120) and said second insulative layer (120') within said trench.

With regard to Claim 3, Hshieh teaches a gate region (125) comprises polysilicon.

With regard to Claim 4, Hshieh teaches a high conductivity region (118) of said first conductivity formed in a drain region (110) adjacent top at least said bottom portion of a trench.

With regard to Claim 5, Hshieh teaches a first insulative layer (120) comprising an oxide.

With regard to Claim 6, Hshieh teaches a second insulative layer (120') comprising an oxide.

With regard to Claim 7, Hshieh teaches a second insulative layer (120') comprising a multi-layer insulative layer, comprising dry oxidation grown oxide layers.

With regard to Claim 8, Hshieh teaches an MIS device that comprises a MOSFET.

Art Unit: 2815

With regard to Claim 9, as best the examiner is able to ascertain the claimed invention, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), including a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type opposite to said first conductivity type, adjacent to said source region and to said sidewall and a drain region, comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein a stress in said substrate along a bottom portion of said trench does not change appreciably and wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being coupled to said first insulative layer and said second insulative layer being thicker than said first insulative layer and a gate region (125) coupled to said first insulative layer and second insulative layer within said trench.

With regard to Claim 10, Hshieh teaches a gate region (125) comprises polysilicon.

With regard to Claim 11, Hshieh teaches a high conductivity region (118) of said first conductivity formed in a drain region (110) adjacent top at least said bottom portion of a trench.

With regard to Claim 12, Hshieh teaches a first insulative layer (120) comprising an oxide.

Art Unit: 2815

With regard to Claim 13, Hshieh teaches a second insulative layer (120') comprising an oxide.

With regard to Claim 14, Hshieh teaches a second insulative layer (120') comprising a multi-layer insulative layer, comprising dry oxidation grown oxide layers.

With regard to Claim 15, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), including a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type opposite to said first conductivity type, adjacent to said source region and to said sidewall and a drain region, comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein a stress in said substrate along a bottom portion of said trench does not change appreciably and wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being coupled to said first insulative layer and said second insulative layer being thicker than said first insulative layer, wherein a thickness of a transition insulative layer at the juncture of said first insulative layer and said second insulative layer is not less than a thickness of said first insulative layer and a gate region (125) coupled to said first insulative layer and second insulative layer within said trench.

Art Unit: 2815

With regard to Claim 16, Hshieh teaches a high conductivity region (118) of said first conductivity formed in a drain region (110) adjacent to at least said bottom portion of a trench.

With regard to Claim 17, Hshieh teaches a semiconductor substrate, which includes layers (105, 110, 130, 138, 160), including a trench extending into said substrate from a surface of said substrate, a source region (140) of a first conductivity type adjacent to a sidewall of said trench and to said surface, a body region (130) of a second conductivity type opposite to said first conductivity type, adjacent to said source region and to said sidewall and a drain region, comprising the epitaxial layer (110), of said first conductivity type adjacent to said body region and to said sidewall, wherein a stress in said substrate along a bottom portion of said trench does not change appreciably and wherein said trench is lined with a first insulative layer (120) along a portion of said sidewall that abuts said body region and wherein said trench with a second insulative layer (120') along said bottom portion of said trench, said second insulative layer being coupled to said first insulative layer and said second insulative layer being thicker than said first insulative layer, wherein a first diameter of said trench taken at a vertical midpoint of said second insulative layer is not greater than a second diameter of said trench taken adjacent to said body region and a gate region (125) coupled to said first insulative layer and second insulative layer within said trench.

Art Unit: 2815

With regard to Claim 18, Hshieh teaches a high conductivity region (118) of said first conductivity formed in a drain region (110) adjacent to at least said bottom portion of a trench.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Edgardo Ortiz (Art Unit 2815), whose telephone number is (703) 308-6183 or by fax at (703) 308-7722. In case the Examiner can not be reached, you might call Supervisor Eddie Lee at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 receptionist whose telephone number is (703) 308-0956.

EO/AU 2815

5/23/02



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SUPERVISORY PATENT EXAMINER
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